

# Life-history and Habits of the Leaf Worm, *Nausinoe geometralis* (Guenee) (Pyraustidae: Lepidoptera)<sup>1</sup>

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(With one text-photograph)

## INTRODUCTION

Although several insects affecting the jasmine crop (*Jasminum* spp.) have been recorded in south India (Ramachandra Rao, 1930; Ramakrishna Ayyar, 1940) some of the destructive ones remained unnoticed until recently. The importance of these latter insects was brought to light by one of the authors (David, 1958). The Leaf Worm, *Nausinoe geometralis* (Guenee), (Pyraustidae: Lepidoptera), is one of them; it infests the plants in many localities in south India and damages them to a considerable extent. Since the biology and habits of the insect in this area are not known, a study was undertaken in the Agricultural College and Research Institute, Coimbatore, during the years 1957 and 1958 and the features of interest noted are presented below.

## HISTORICAL

Hampson (1896), the first to record the Leaf Worm in the Indian region, included it in the genus *Lepyrodes* Guenee. There seems to be no further mention of it in Indian literature. In the present investigation it was noted in Coimbatore and was identified by Dr. Tams through the courtesy of the Director, Commonwealth Institute of Entomology, London.

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<sup>1</sup>Communicated by the Dean, Agricultural College and Research Institute, Coimbatore.

## DISTRIBUTION

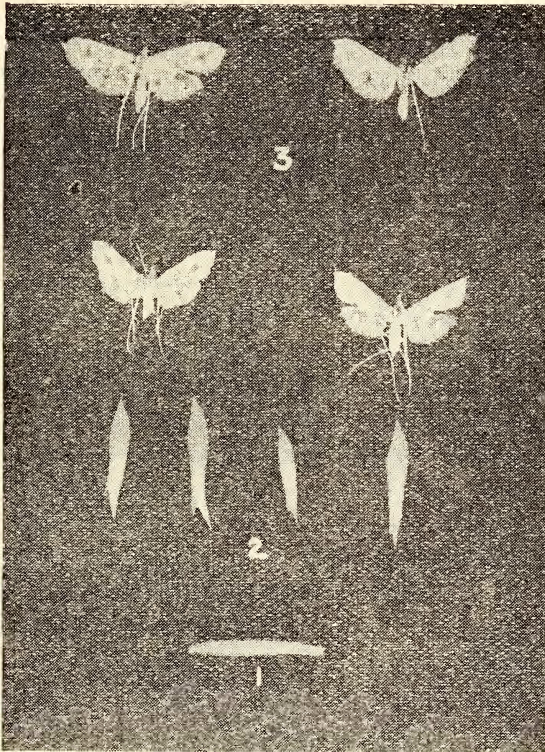
The range of occurrence of the insect given by Hampson (1896), includes west Africa, the whole of India, Ceylon, Burma, Java, Formosa, China, and Australia. In India the localities where it had been collected are not given. So far as south India is concerned, the collection of insects in the Agricultural College and Research Institute, Coimbatore, which fairly represents the insects of the region, does not include this species. Since, as stated above, considerable attention has been paid to the insects affecting Jasmine in south India, a conspicuous insect of this type which damages the plant in a marked manner could not have been easily overlooked. It has, therefore, to be concluded that the insect has spread to this region only recently. As there is no reference to this insect even from other parts of India, it has to be regarded as rare. Currently it has been collected in Cuddalore in the north-east, Coimbatore in the mid-west, and Kovilpatti in the southern parts of Madras State, and in Pattambi (Palghat District) in the central part of Kerala State.

## THE INSECT AND ITS IMMATURE STAGES

*The moth.* The adult moth (Text-photo, 3) is about 10 mm. in length with a wing expanse of 22 mm. for the largest specimen, which is slightly smaller than the 26 mm. quoted by Hampson (1896). The yellow, filiform antennae reach the tip of the wings. The palpi are yellow and fluffy and project in front of the large, black eyes. The abdomen is purplish brown interspersed with dorsal and lateral white patches in each segment; it is slightly swollen in the middle and tapers towards the anal end. The wings appear brownish but are marked with yellow and black transverse lines; the fore wing has five large irregularly elongated white spots and four small circular ones, while the hind wing has five large spots and one small spot.

The moth generally rests by hanging under the lamina of a leaf. It chooses leaves on the outermost portions of plants and faces away from the shaded, bushy stem, evidently preferring to face the open, lighted space. The wings are held half open at an angle of about 45° with the abdomen. It gets disturbed easily by the approach of a person or the shaking of the plant, and flies away in a quick and zigzag manner. It flies only a short distance and alights in another portion of the plant. It is usually active during the day and many can be seen flying about when the plant is shaken.

*The egg.* The moth lays eggs singly on the laminae of the leaves, either on the upper or the lower surface. It does not appear to



The Leaf Worm, *Nausinoe geometralis* : 1. The larva; 2. Pupae ; 3. Adults.

discriminate between the tender and older leaves, as the eggs are found on any portion of the plant in the field. The egg is greenish yellow, translucent, circular, and flat. It measures about 1 mm. in width and can only be distinguished with difficulty on the leaf. Occasionally three or four eggs may overlap each other. In captivity the moth laid only 15 to 20 eggs in all.

*The larva.* The caterpillar which hatches out from the egg measures about 6 mm. and is slender with a light yellow colour. The head is as long as broad, and narrower than the body. It undergoes 4 moults and becomes full-grown when it measures about 20 mm. in length (Text-photo, 1). It turns green, with the head having a brownish wash and with smaller or longer dark longitudinal bands on the dorso-lateral aspect of the thorax and abdomen. Thin,

white, short hairs are found on the abdomen surrounded by dark, thin, circular lines which, however, may not be developed in some cases. Each segment of the abdomen bears three tubercles with dark spiracles. The five pairs of prolegs are yellowish and have circular crochets.

The caterpillar attacks the leaves of the plant mostly in the lower bushy and shaded portions. Occasionally, however, it appears also on the terminal tender shoots. It webs the leaves in an open and loose manner. The threads of silk are seen like cobweb on the surface of the leaves or between the leaves. Faecal pellets get entangled in some places and make the web appear dirty. The web gets extended over the adjacent leaves as the successive generations of caterpillars feed on other leaves in the vicinity. Thus a composite web of loose connecting strands over the whole branch or a number of side branches is developed, which stands out characteristically in the infested plants.

The caterpillar is found on the upper or lower surface of the leaves and scrapes only the parenchymatous matter in the early as well as in the later stages. Several caterpillars may feed at one time on different portions of the same leaf. In severe cases the webbings become a nest which harbours several caterpillars almost in a gregarious manner. The skeletons of the leaves, riddled with small holes in some places, dry up in course of time but are held intact in the webbing. If the plant is left undisturbed the area of attack increases to a considerable extent.

*The pupa.* The insect pupates in the loose silk strands of the webbing, suspending the pupa in them. When the caterpillar is about to pupate it comes to rest on the web, mostly in a horizontal position and in rare cases vertically. Further strands of silk are added to the head and anal regions so as to make these portions thick and strong. It then contracts itself into a smooth, green, spindle-shaped, naked pupa held in position by the pointed ends, which are attached to the silk threads. The swollen portion of the pupa is broadest in the anterior third and tapers to both ends. The fore part is sharply conical while the hind one is elongate and gradually diminishes in size. The appendages stand out distinctly and fall only slightly short of the full length of the pupa (Text-photo, 2). In two or three days the pupa turns yellow and looks like a dry leaf; it remains like this till the moth emerges.



## LIFE AND SEASONAL HISTORY

Observations on the life and seasonal history of the Leaf Worm made during the last two years in Coimbatore showed that it occurs all through the year on the plants in gardens. The density of population increases from May onwards and reaches the peak in July. It continues to be heavy up to December and diminishes thereafter till it reaches the lowest level in April.

In laboratory rearing the life cycle of the insect was found to range from 22 to 24 days in the monsoon season of July and August. The egg, larval, and pupal periods lasted 3 to 4, 12 to 15, and 6 to 7 days respectively.

## FOOD PLANTS OF THE INSECT

In south India the insect has been so far noted only on Jasmine and is here taken to be monophagous. It may be noted here that the food plant of the insect had not so far been known in India. Among the different species of Jasmine it occurs on *Jasminum sambac* and *J. flexile* quite commonly, but only occasionally has been noted on *J. auriculatum*. Stray incidence of the insect has been noted on *J. grandiflorum* but *J. malabaricum* was not affected.

## ECOLOGY

In Coimbatore the insect occurred on the terminal shoots during periods of dry and sunny weather in summer, and in bushy portions in dense foliage with elaborate webbing in the rainy season. Even heavy rains did not have any deleterious effect on the progress of the insect. The distribution of the insect in south India given above shows that the insect breeds with equal ease both in the warm and dry plains of the east and the rainy and humid hills of the west.

## NATURAL ENEMIES

Although the Leaf Worm occurs in rather great abundance in this area, no regular parasites have been obtained from any of the stages of the insect so far. However, stray pupal cases of *Apanteles* sp. were noted in the webbings in the plants and it is believed that *Apanteles* attacks the insect in its larval stage.

Several instances of fresh attacks of the insect in terminal portions of the plant with the characteristic feeding and webbing were found arrested and the caterpillars were missing. This would appear to be due to the predatory activities of spiders and mantids which visit

the plants often. Some spiders live in the rolled-up leaves of the plant itself and account for the disappearance of various insects which affect the plants. However, when the insect lives in its extensive webbings, it appears to be fairly free from the inroads of predators.

#### ECONOMIC STATUS

As stated above the characteristic feeding of the insect reduces the leaves to mere veins which dry away in course of time. When the density of population increases the severity of damage is considerably increased. Consequently the vitality of the plant is reduced which tells upon the growth of the plant and the production of buds. *J. sambac* being a slow grower suffers more from the attack than *J. flexile* which easily overcomes the infestation by rapid and extensive production of new shoots. When the insect attacks the terminal shoot, only the second or the third leaf is damaged, leaving the top shoot to grow in the normal way, but the vigour of the shoot is much reduced.

#### CONTROL OF THE INSECT

When the infestation of the insect becomes severe, it becomes necessary to institute control measures. A fairly heavy infestation occurred in September on *J. sambac*. DDT 0.1%, BHC 0.05%, and Parathion (Folidol) 0.025% were sprayed in different portions of the affected area of the garden and were compared against untreated ones. It was found that the plants treated with insecticides were kept free from the infestation for the next one month; later the infestation in the untreated plants also dwindled.

#### ACKNOWLEDGEMENTS

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